



18370 - Rockin' photospheres: how White Dwarf stars respond to heavy metal accretion

Cycle: 34, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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Dr. Siyi Xu (CoI)	NOIRLab - Gemini North (HI)

VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) WD0106-358	COS/FUV COS/NUV	2	10-Aug-2026 09:01:16.0	yes
02	(2) WD2149+021	COS/FUV COS/NUV	1	10-Aug-2026 09:01:17.0	yes
03	(3) WD1337+705	COS/FUV COS/NUV	1	10-Aug-2026 09:01:17.0	yes

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
04	(4) WD1822+410	COS/FUV COS/NUV	3	10-Aug-2026 09:01:19.0	yes
05	(5) WD0420+520	COS/FUV COS/NUV	2	10-Aug-2026 09:01:20.0	yes
06	(6) WD1134+300	COS/FUV COS/NUV	1	10-Aug-2026 09:01:21.0	yes
07	(7) WD1511+009	COS/FUV COS/NUV	2	10-Aug-2026 09:01:22.0	yes
08	(8) WD1052+273	COS/FUV COS/NUV	2	10-Aug-2026 09:01:24.0	yes
09	(9) WD0308-565	COS/FUV COS/NUV	2	10-Aug-2026 09:01:25.0	yes

16 Total Orbits Used

ABSTRACT

Metal-polluted WDs are important laboratories for studying the composition of exoplanets and the evolution of the planetary systems, where these metals originated. The far-UV wavelength range is crucial for these studies, as they host a large number of metal-line transitions that provide subtle diagnostics of the WD photospheric properties, yet only a handful have been observed at wavelengths below 1140 Angstroms. We propose to use the Cosmic Origins Spectrograph to observe five metal-line WDs with a wide range of inferred accretion rates using the G130M/1055 mode, which spans the Lyman Ultraviolet (~912 to 1200 Å) and includes lines from several elements including N, P, S and Si. We will also observe a comparison set of four pristine WDs, which will allow us to accurately flux-calibrate our entire sample and investigate how the photospheres of WDs with $T_{\text{eff}} \sim 20,000$ K behave under different accretion conditions.

OBSERVING DESCRIPTION

All targets will be acquired using NUV ACQ/IM using the BOA.

MIRROR A will be used for all targets except WD 1134+300 (GD 140, Target 6, Visit 06), which will use MIRROR B.

The exposure times have been rounded up slightly to ensure the acquisitions are successful

The science exposure will use G130M/1055 at the default lifetime position, LP7.

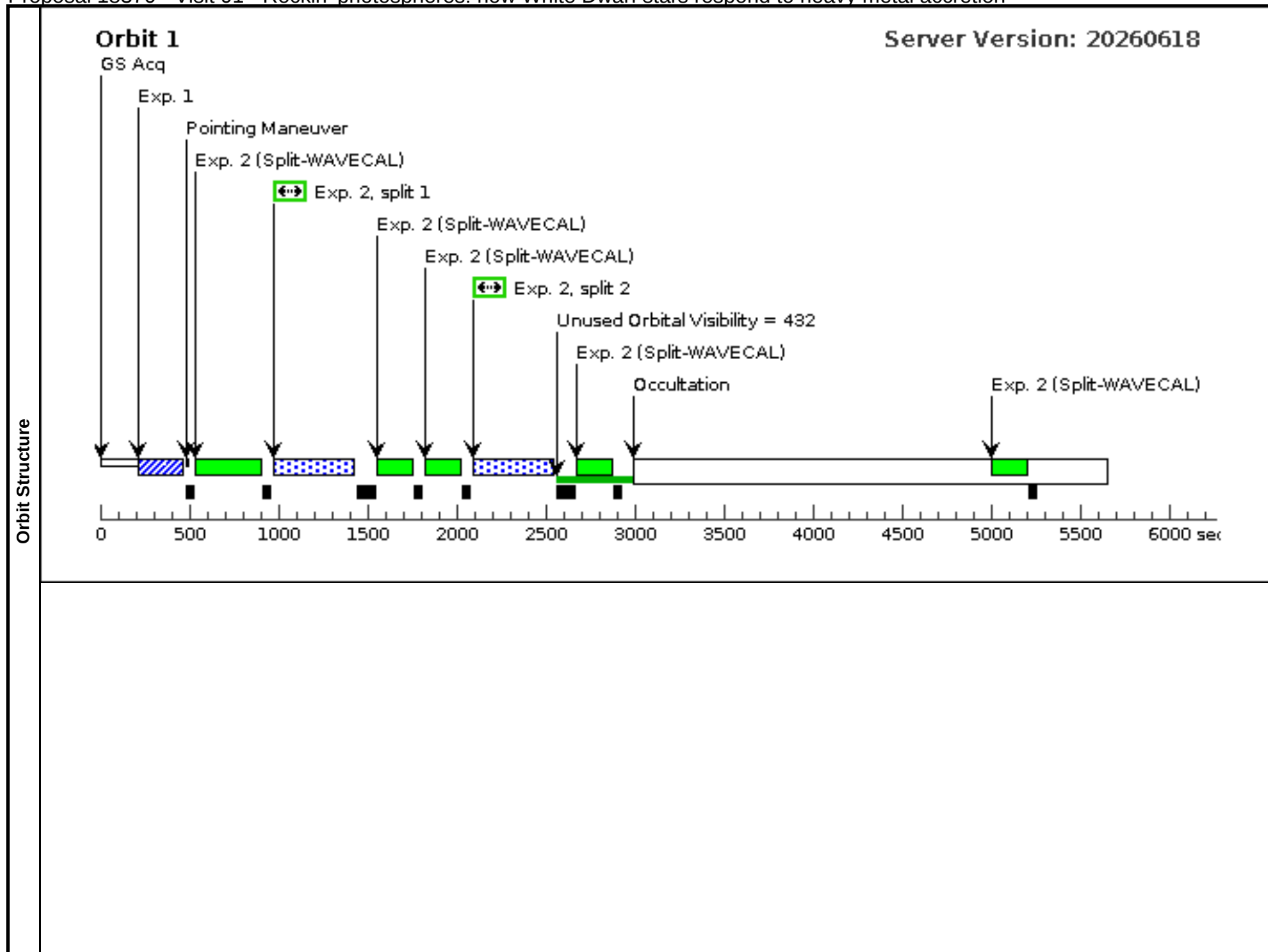
The ETC numbers reported are those using synthetic models and specifying $S/N=10$ at 1085Å. Note that the S/N changes sharply around this wavelength for all targets because of the throughput cliff at 1150Å as well as their intrinsic spectra. The spectral region of interest extends down to the Lyman limit (for WD models), and to approximately 1050Å for observing the photospheric metal lines. Therefore the exposure times from the ETC runs are minimum required values. (They provide the correct buffer fill times and the correct brightest pixel rates.)

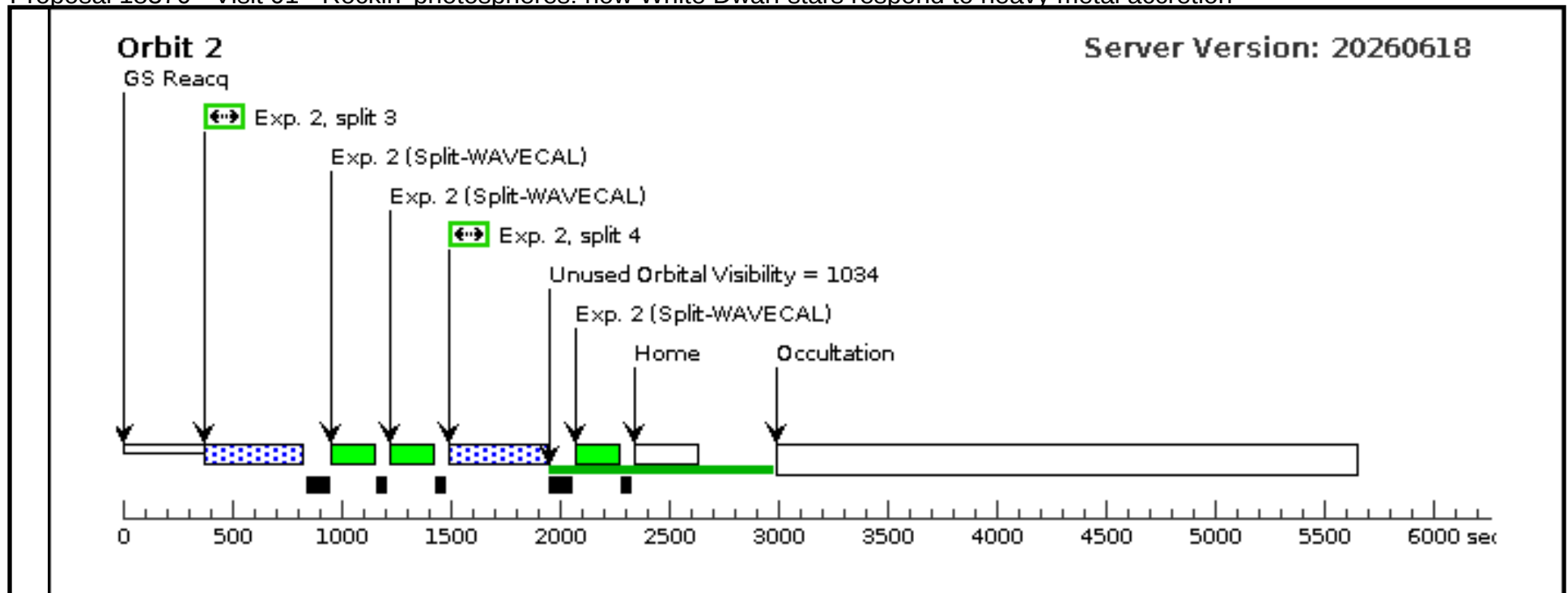
For most of the target we have chosen exposure times that are within the orbit allocation, but do not fill the orbits. The exceptions are for the faintest targets/visits 04 and 07 where we have used the auto-adjust feature to maximize exposure times.

We note that the orbit request in the Phase I proposal used v33.1 of the exposure time calculator. The new synphot files along with the expected time-dependent sensitivity trend used in v34.2 have resulted in moderate increases in the exposure times, but more importantly in significant decreases in the brightest pixel count-rates. Our Phase I proposal reported a COS lifetime impact measure of 153 counts based on those minimum required exposure times. Our actual exposure times used in the Phase II yield a slightly lower impact measure of 144 counts.

Proposal 18370 - Visit 01 - Rockin' photospheres: how White Dwarf stars respond to heavy metal accretion

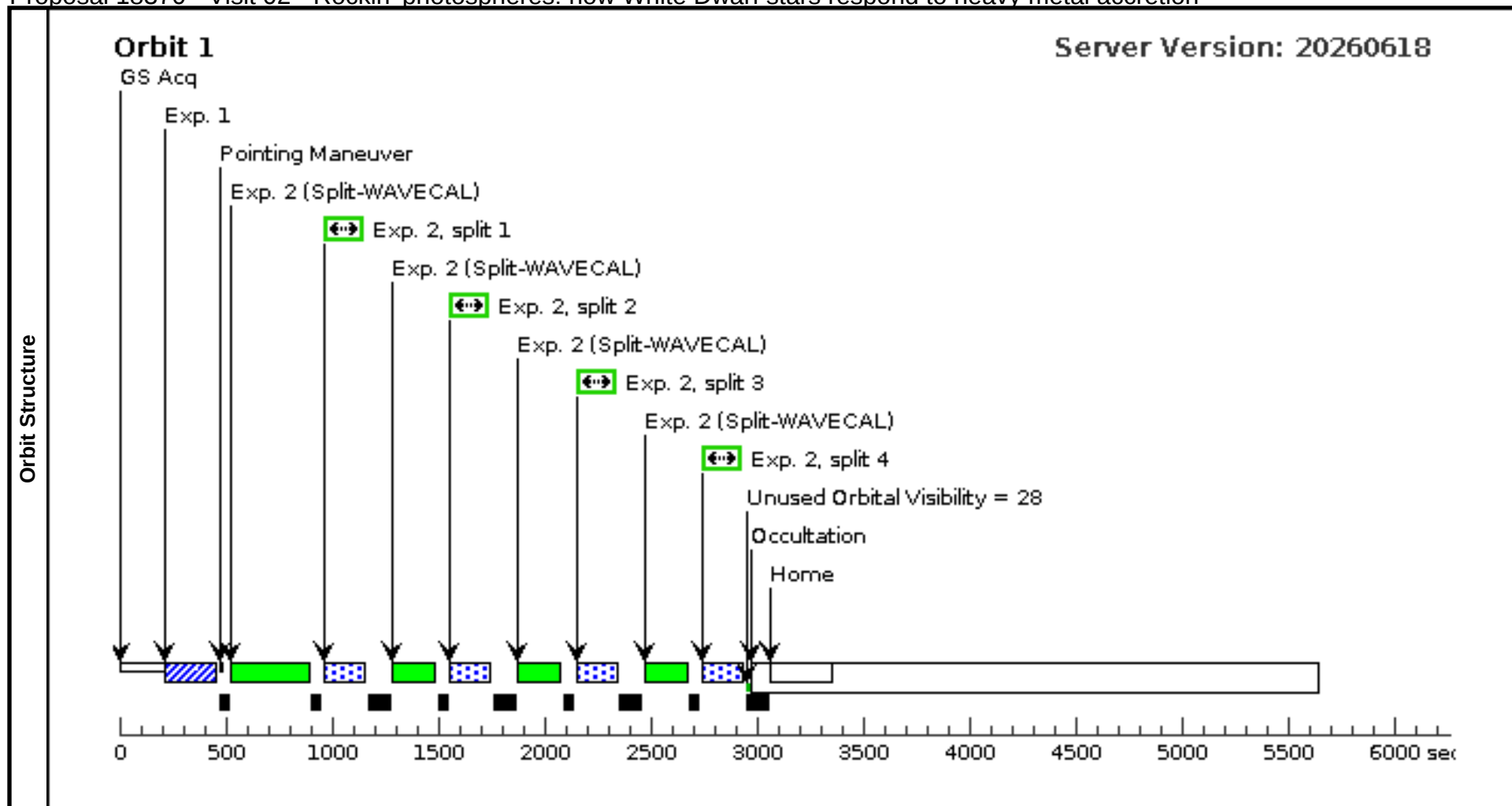
Visit	Proposal 18370, Visit 01, implementation										Mon Aug 10 13:01:25 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/FUV, COS/NUV											
	Special Requirements: (none)											
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(1)	WD0106-358	RA: 01 08 20.7693 (17.0865387d)		Proper Motion RA: -38.56 mas/yr		V=14.72		Reference Frame: ICRS			
		Alt Name1: GD683	Dec: -35 34 41.70 (-35.57825d)		Proper Motion Dec: -52.062 mas/yr							
			Equinox: J2000		Parallax: 0.0106896"							
					Epoch of Position: 2000							
		Comments: 2026_Jul_24: target information verified RS										
	This object was generated by the targetselector and retrieved from the SIMBAD database.											
	SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.											
	Category=STAR											
	Description=[DA, DZ]											
	Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	NUV ACQ (COS.ta.236 1982)	(1) WD0106-358	COS/NUV, ACQ/IMAGE, BOA		MIRRORA				15 Secs (15 Secs)		
										[==>]		[1]
	2	G130M/105 5 (COS.sp.236 2491)	(1) WD0106-358	COS/FUV, TIME-TAG, PSA		G130M 1055 A	LIFETIME-POS=LP 7;			400 Secs (1600 Secs)		
							FP-POS=ALL;			[==>(Split 1)]		[1]
							BUFFER-TIME=40 0			[==>(Split 2)]		[2]
									[==>(Split 3)]			
									[==>(Split 4)]			





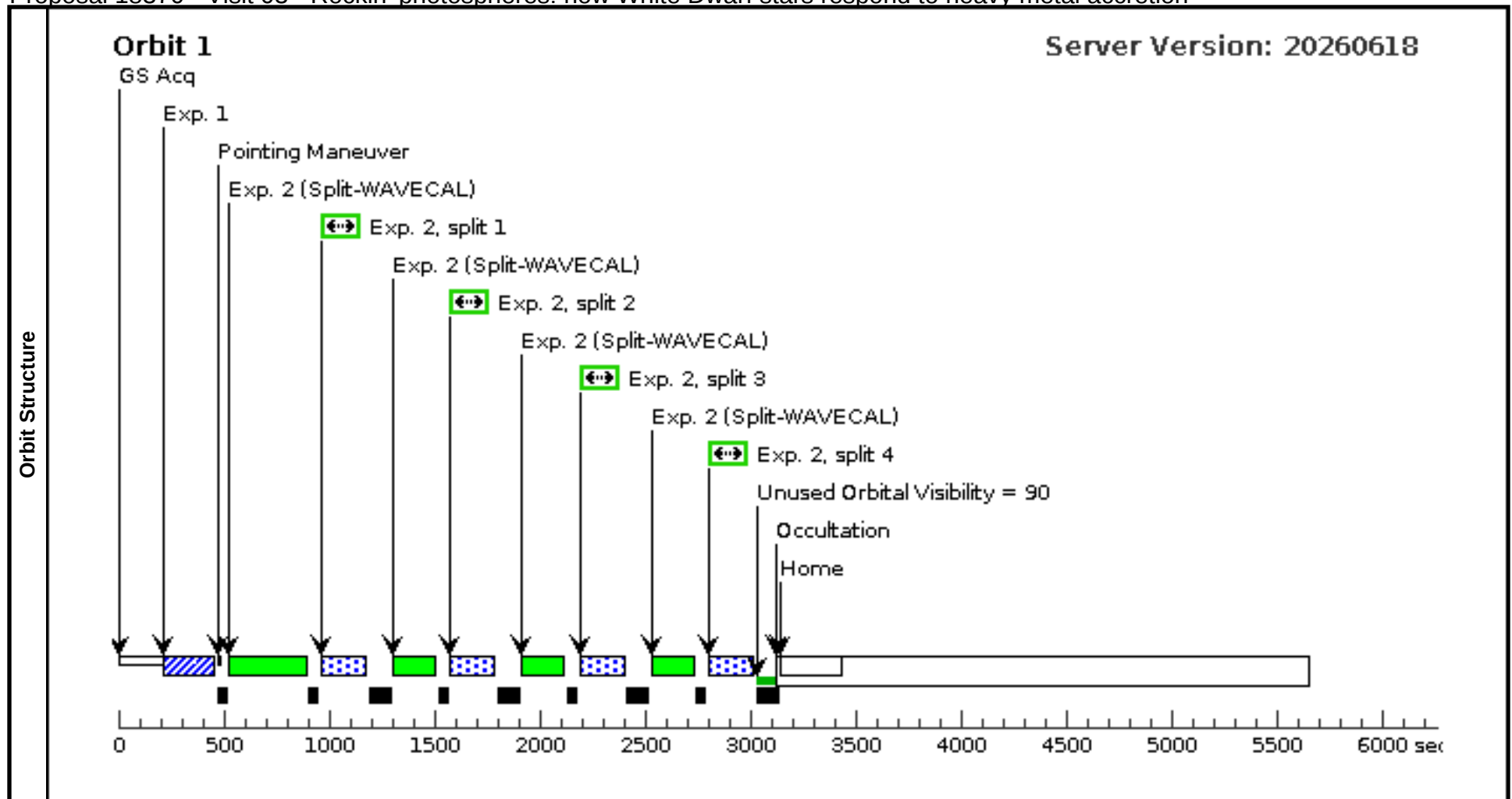
Proposal 18370 - Visit 02 - Rockin' photospheres: how White Dwarf stars respond to heavy metal accretion

Visit	Proposal 18370, Visit 02, implementation										Mon Aug 10 13:01:26 GMT 2026	
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	Scientific Instruments: COS/FUV, COS/NUV											
	Special Requirements: (none)											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Fluxes		Miscellaneous	
	(2)	WD2149+021	RA: 21 52 25.3790 (328.1057458d)			Proper Motion RA: 15.323 mas/yr			V=12.743		Reference Frame: ICRS	
		Alt Name1: EGGR150	Dec: +02 23 19.58 (2.38877d)			Proper Motion Dec: -300.533 mas/yr						
			Equinox: J2000			Parallax: 0.0443255"						
						Epoch of Position: 2000						
		Comments: 2026_Jul_27: target information verified RS										
	This object was generated by the targetselector and retrieved from the SIMBAD database.											
	SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.											
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	Description=[DA]											
	Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	NUV ACQ (COS.ta.236 1985)	(2) WD2149+021	COS/NUV, ACQ/IMAGE, BOA		MIRRORA		GS ACQ SCENARI O BASE1OR		10 Secs (10 Secs)		
										[==>]		[1]
	2	G130M/105 5 (COS.sp.236 2508)	(2) WD2149+021	COS/FUV, TIME-TAG, PSA		G130M 1055 A	LIFETIME-POS=LP 7; FP-POS=ALL; BUFFER-TIME=14 0			140 Secs (560 Secs)		
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										[==>(Split 2)]		
										[==>(Split 3)]		
											[==>(Split 4)]	



Proposal 18370 - Visit 03 - Rockin' photospheres: how White Dwarf stars respond to heavy metal accretion

Visit	Proposal 18370, Visit 03, implementation										Mon Aug 10 13:01:26 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/FUV, COS/NUV											
	Special Requirements: (none)											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(3)	WD1337+705	RA: 13 38 50.4781 (204.7103254d)			Proper Motion RA: -402.079 mas/yr		V=12.6		Reference Frame: ICRS		
		Alt Name1: LAWD52	Dec: +70 17 7.64 (70.28546d)			Proper Motion Dec: -24.556 mas/yr						
			Equinox: J2000			Parallax: 0.0377291"						
						Epoch of Position: 2000						
		Comments: 2026_Jul_27: target information verified RS										
	This object was generated by the targetselector and retrieved from the SIMBAD database.											
	SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.											
	Category=STAR											
	Description=[DA, DZ]											
	Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	NUV ACQ (COS.ta.236 1993)	(3) WD1337+705	COS/NUV, ACQ/IMAGE, BOA		MIRRORA		GS ACQ SCENARI O BASE1OR		10 Secs (10 Secs)		
										[==>]		[1]
	2	G130M/105 5 (COS.sp.236 3638)	(3) WD1337+705	COS/FUV, TIME-TAG, PSA		G130M 1055 A	LIFETIME-POS=LP 7; FP-POS=ALL; BUFFER-TIME=16 0			160 Secs (640 Secs)		
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										[==>(Split 3)]		
											[==>(Split 4)]	

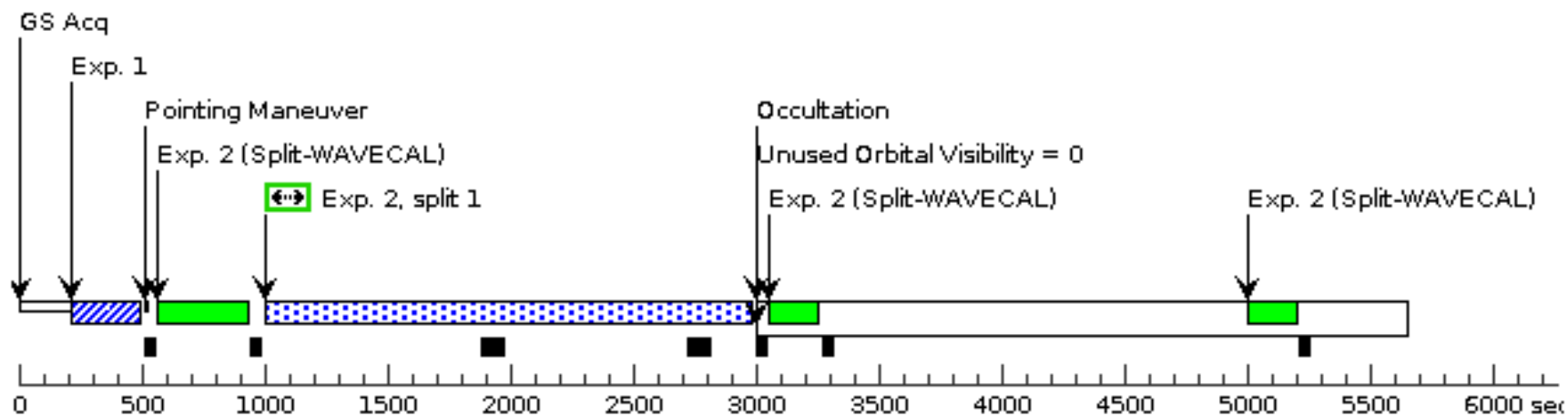


Proposal 18370 - Visit 04 - Rockin' photospheres: how White Dwarf stars respond to heavy metal accretion

Visit	Proposal 18370, Visit 04, implementation										Mon Aug 10 13:01:26 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/FUV, COS/NUV											
	Special Requirements: (none)											
Fixed Targets	#	Name		Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(4)	WD1822+410		RA: 18 23 37.0115 (275.9042146d)		Proper Motion RA: 0.531 mas/yr		V=14.288		Reference Frame: ICRS		
		Alt Name1: GD378		Dec: +41 04 2.11 (41.06725d)		Proper Motion Dec: 138.34 mas/yr						
				Equinox: J2000		Parallax: 0.0229244"						
					Epoch of Position: 2000							
	Comments: 2026_Jul_27: target information verified RS											
This object was generated by the targetselector and retrieved from the SIMBAD database.												
SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.												
Category=STAR												
Description=[DA, DB, DZ]												
Extended=NO												
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	NUV ACQ (COS.ta.236 1999)	(4) WD1822+410	COS/NUV, ACQ/IMAGE, BOA		MIRRORA		GS ACQ SCENARI O BASE1OR		30 Secs (30 Secs)		
										[==>]		[1]
	2	G130M/105 5 (COS.sp.236 3932)	(4) WD1822+410	COS/FUV, TIME-TAG, PSA		G130M 1055 A	LIFETIME-POS=LP 7; FP-POS=ALL; BUFFER-TIME=84 0			950 Secs (6390 Secs)		
										[==>1929.0 Secs (Split 1)]		[1]
										[==>(Split 2)]		[2]
[==>(Split 3)]												
[==>2561.0 Secs (Split 4)]		[3]										

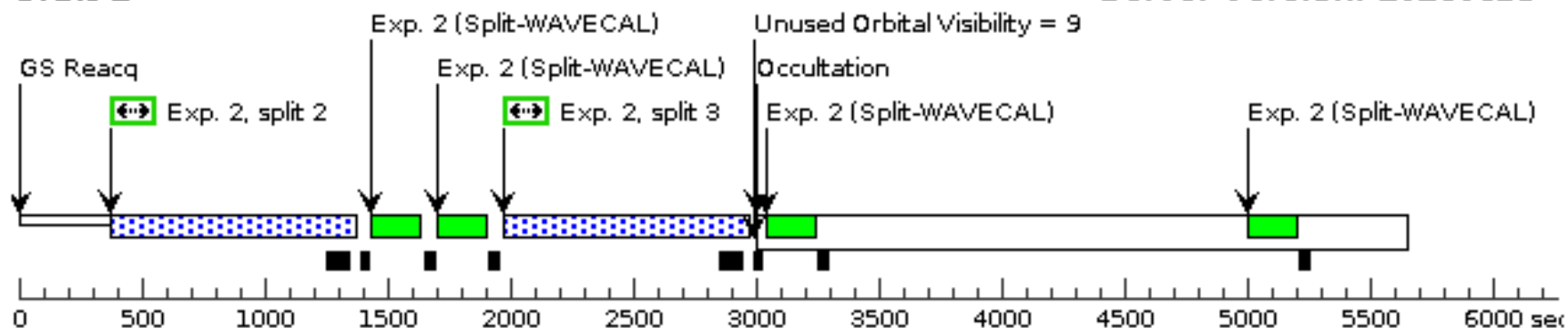
Orbit 1

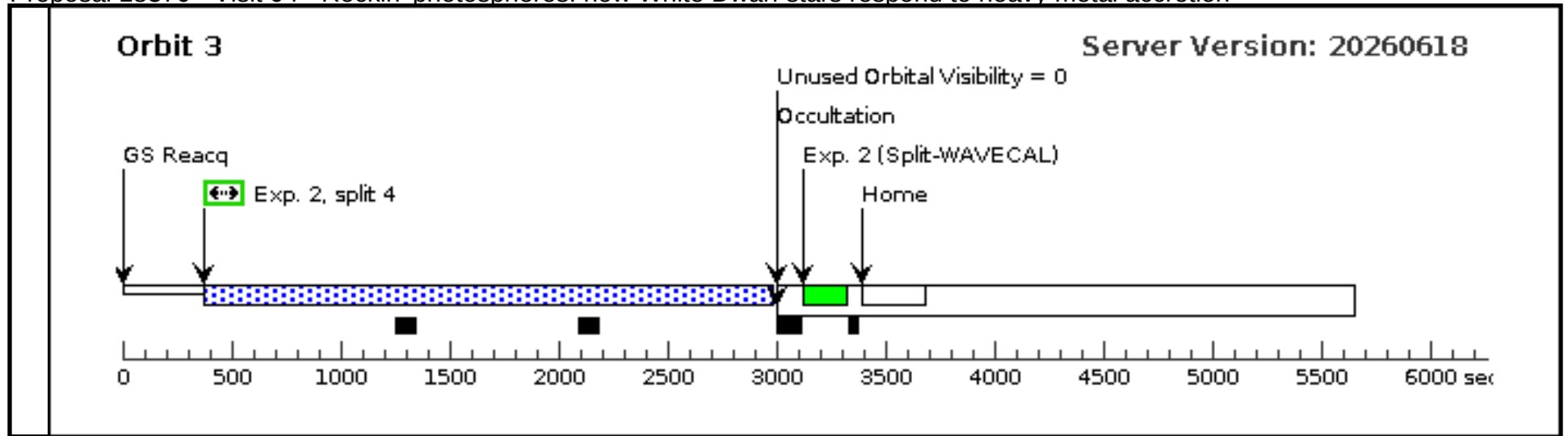
Server Version: 20260618



Orbit 2

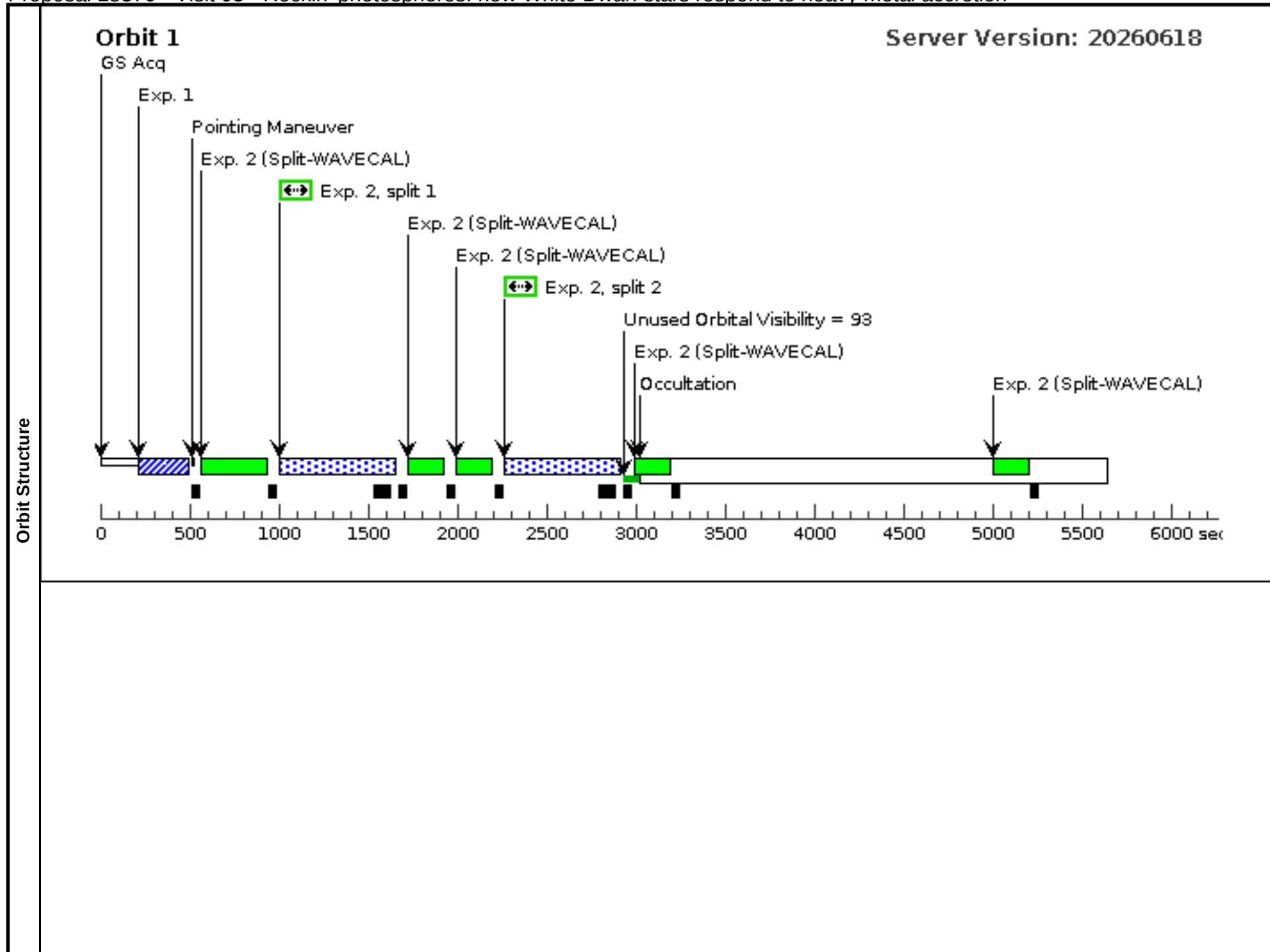
Server Version: 20260618

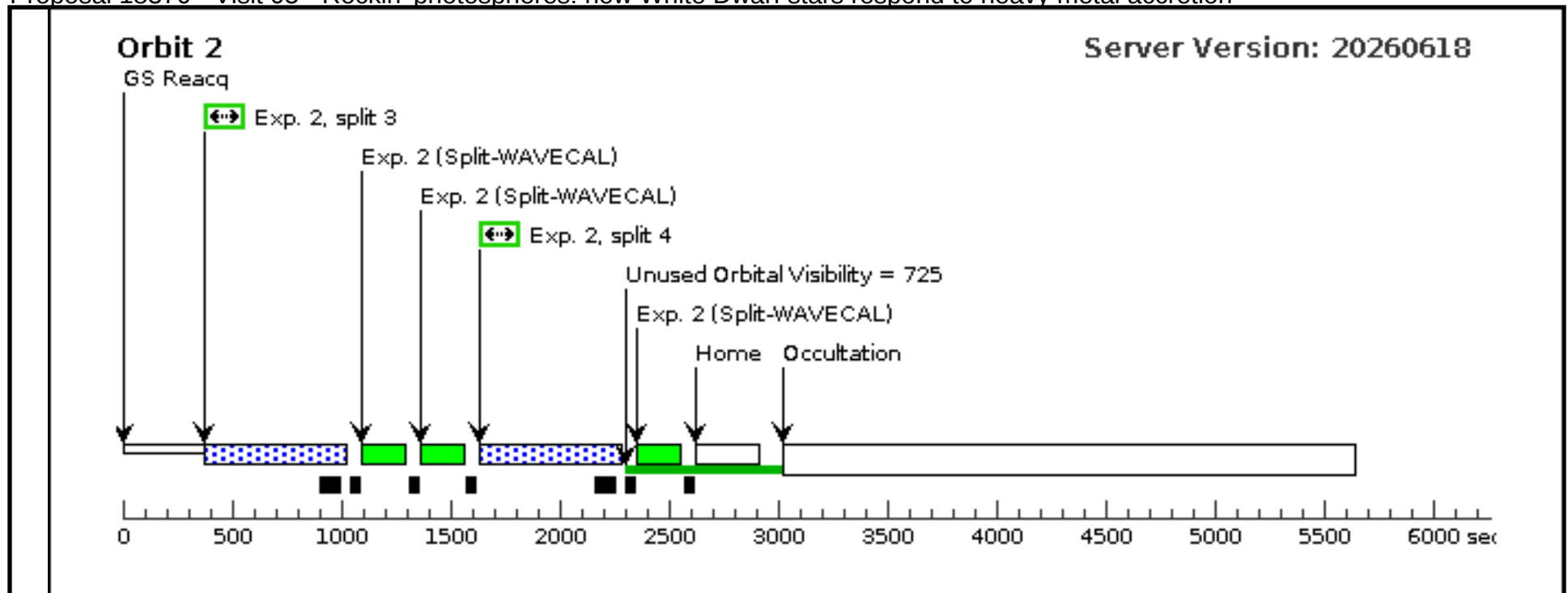




Proposal 18370 - Visit 05 - Rockin' photospheres: how White Dwarf stars respond to heavy metal accretion

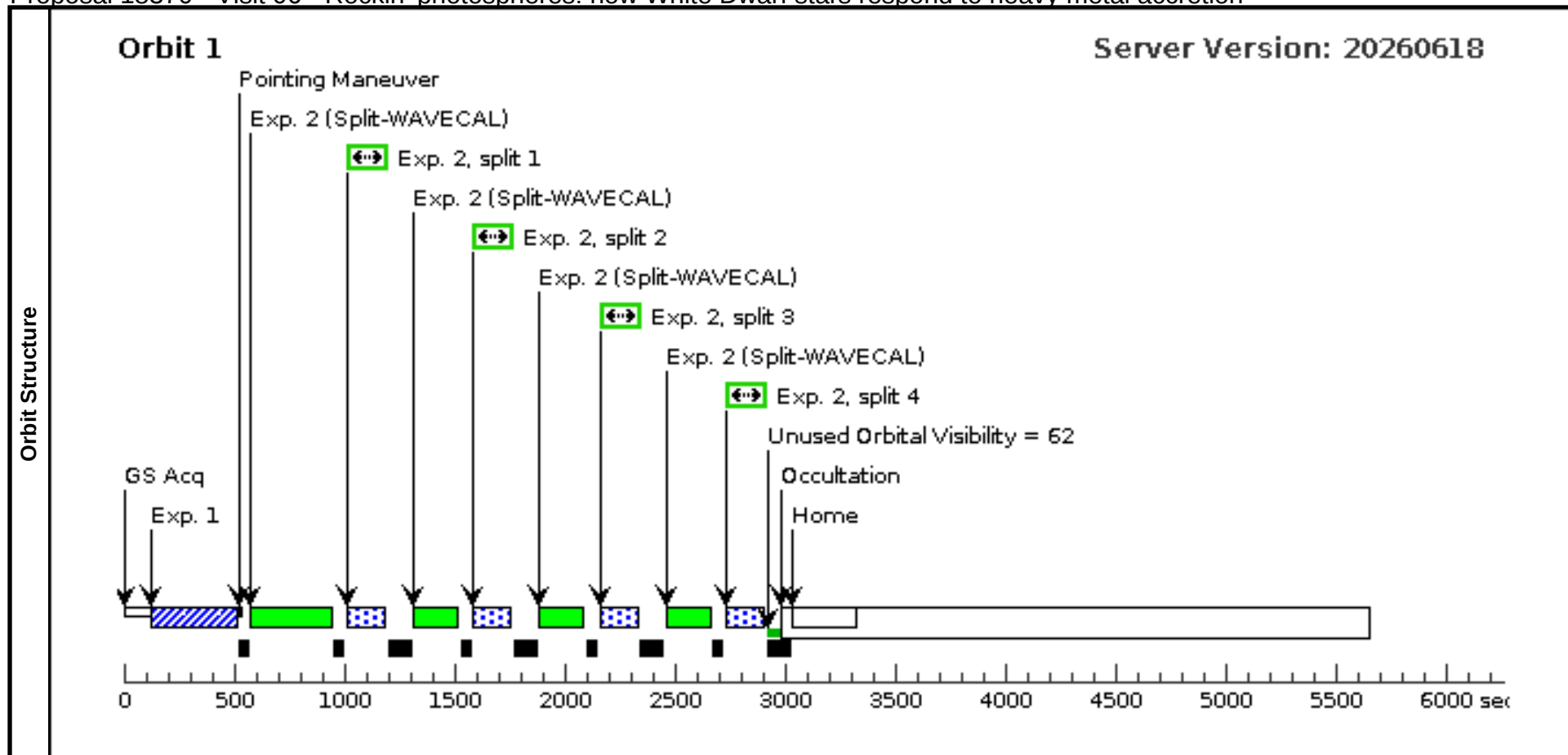
Visit	Proposal 18370, Visit 05, implementation										Mon Aug 10 13:01:26 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/FUV, COS/NUV											
	Special Requirements: (none)											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(5)	WD0420+520	RA: 04 24 15.7372 (66.0655717d)			Proper Motion RA: -35.702 mas/yr		V=15.01		Reference Frame: ICRS		
		Alt Name1: KPD0420+5203	Dec: +52 10 10.64 (52.16962d) Equinox: J2000			Proper Motion Dec: -8.102 mas/yr Parallax: 0.0136905" Epoch of Position: 2000						
	Comments: 2026_Jul_27: target information verified RS											
	This object was generated by the targetselector and retrieved from the SIMBAD database.											
	SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM. Category=STAR Description=[DA, DZ] Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	NUV ACQ (COS.ta.236 2000)	(5) WD0420+520	COS/NUV, ACQ/IMAGE, BOA		MIRRORA		GS ACQ SCENARI O BASE1OR		30 Secs (30 Secs)		
										[==>]		[1]
	2	G130M/105 5 (COS.sp.236 3676)	(5) WD0420+520	COS/FUV, TIME-TAG, PSA		G130M 1055 A	LIFETIME-POS=LP 7; FP-POS=ALL; BUFFER-TIME=49 0			600 Secs (2400 Secs)		
										[==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]		[1] [2]





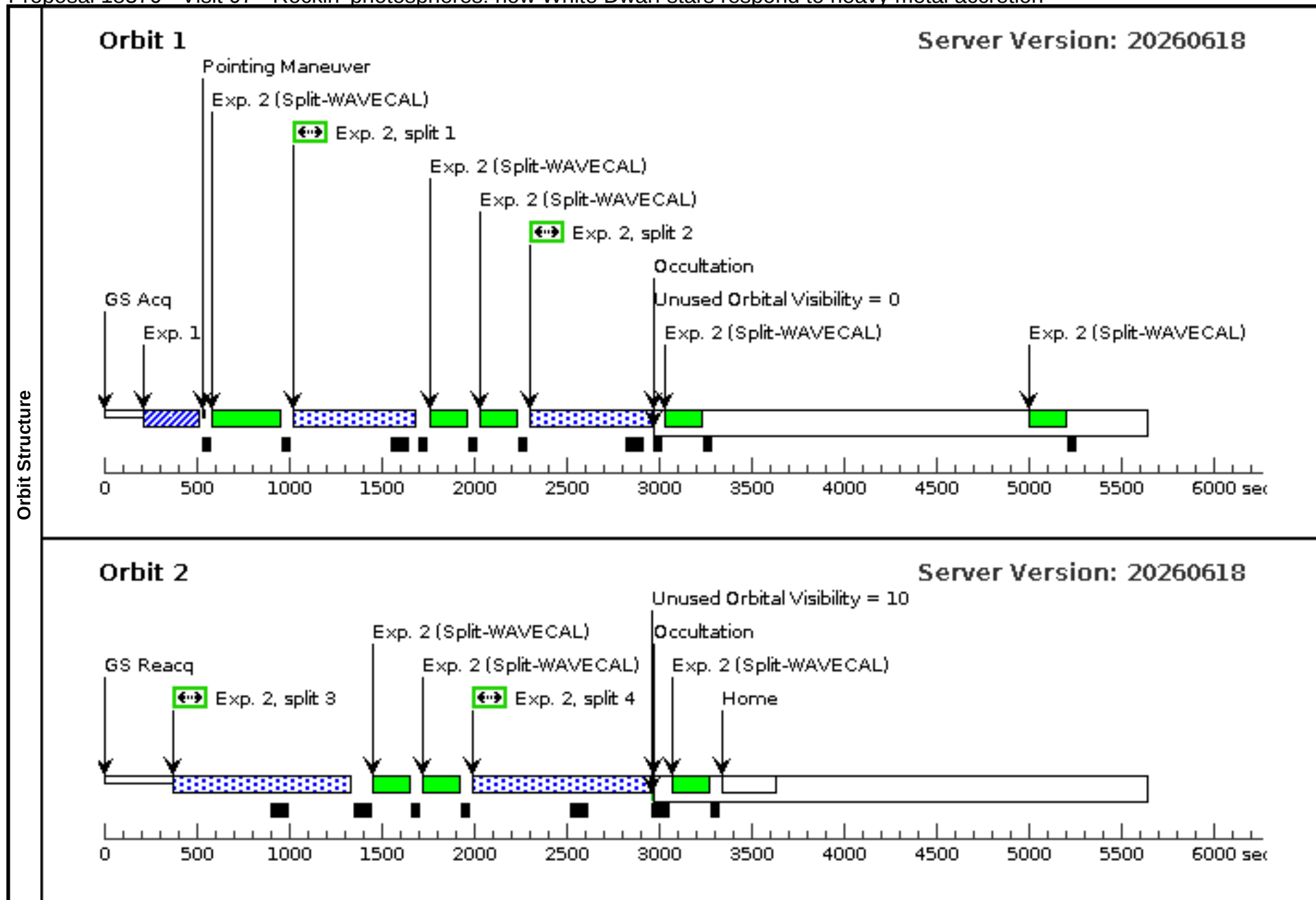
Proposal 18370 - Visit 06 - Rockin' photospheres: how White Dwarf stars respond to heavy metal accretion

Visit	Proposal 18370, Visit 06, implementation										Mon Aug 10 13:01:26 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/FUV, COS/NUV											
	Special Requirements: (none)											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Fluxes		Miscellaneous	
	(6)	WD1134+300	RA: 11 37 5.1041 (174.2712671d)			Proper Motion RA: -147.714 mas/yr			V=12.45		Reference Frame: ICRS	
		Alt Name1: GD140	Dec: +29 47 58.29 (29.79953d)			Proper Motion Dec: -12.533 mas/yr						
			Equinox: J2000			Parallax: 0.0637329"						
						Epoch of Position: 2000						
		Comments: 2026_Jul_27: target information verified RS										
	This object was generated by the targetselector and retrieved from the SIMBAD database.											
	SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.											
	Category=STAR											
	Description=[DA]											
	Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	NUV ACQ (COS.ta.236 2026)	(6) WD1134+300	COS/NUV, ACQ/IMAGE, BOA		MIRRORB		GS ACQ SCENARI O BASE1OR		35 Secs (35 Secs)		
										[==>]		[1]
	2	G130M/105 5 (COS.sp.236 3677)	(6) WD1134+300	COS/FUV, TIME-TAG, PSA		G130M 1055 A	LIFETIME-POS=LP 7; FP-POS=ALL; BUFFER-TIME=12 0			120 Secs (480 Secs)		
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										[==>(Split 2)]		
										[==>(Split 3)]		
										[==>(Split 4)]		



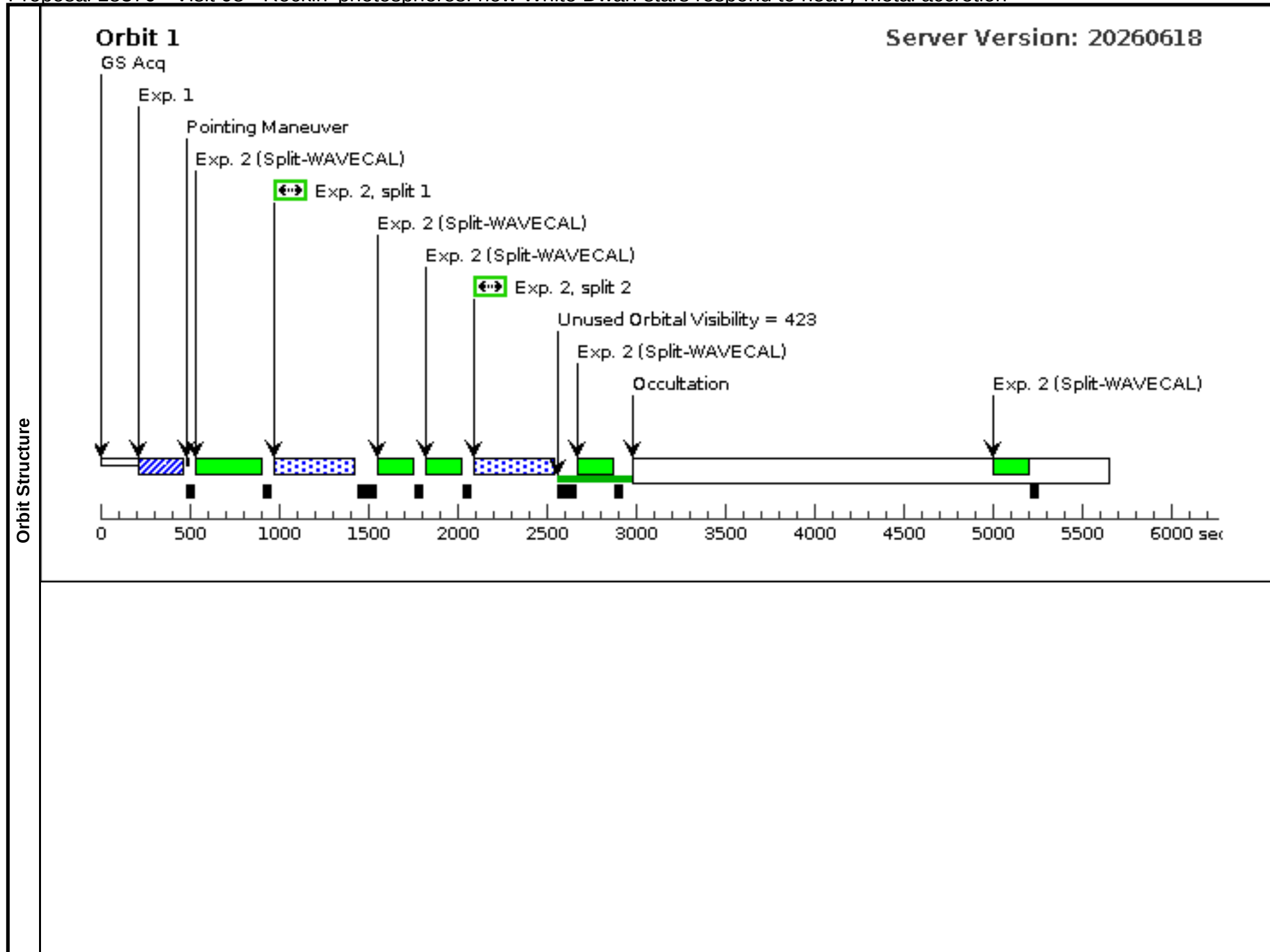
Proposal 18370 - Visit 07 - Rockin' photospheres: how White Dwarf stars respond to heavy metal accretion

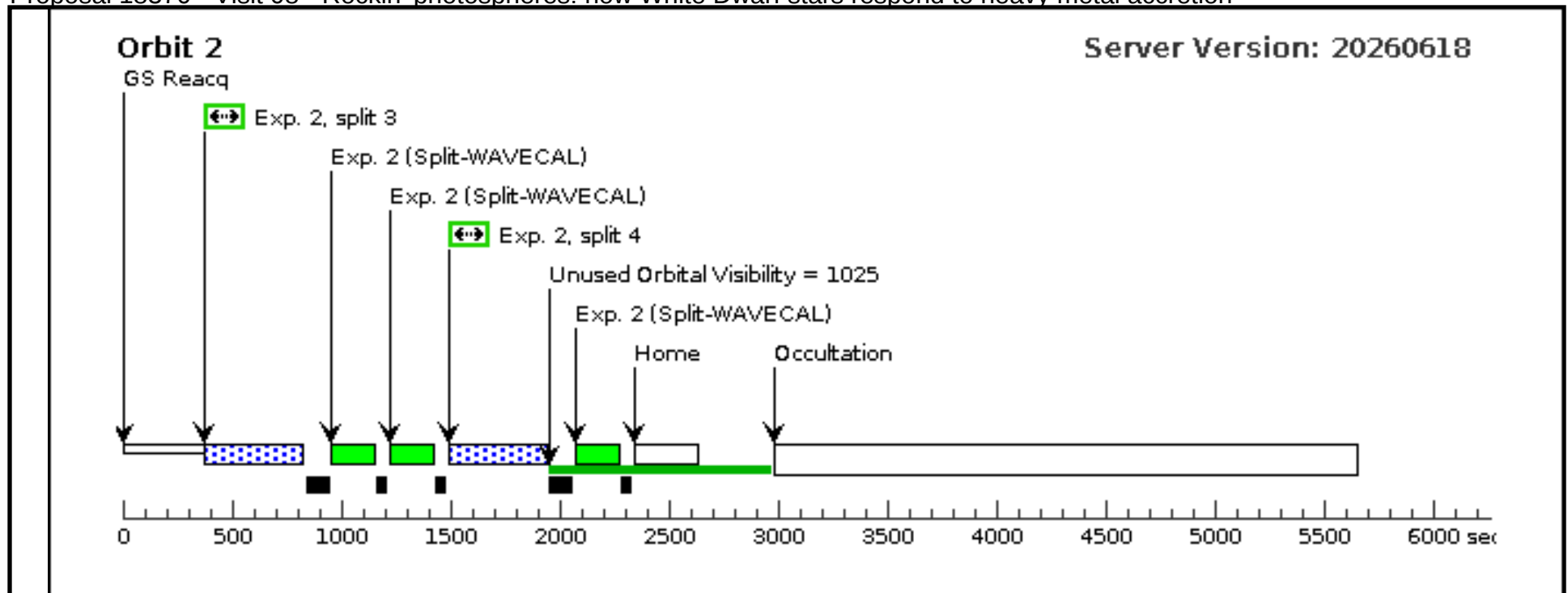
Visit	Proposal 18370, Visit 07, implementation										Mon Aug 10 13:01:26 GMT 2026
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: COS/FUV, COS/NUV										
	Special Requirements: (none)										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections			Fluxes	Miscellaneous			
	(7)	WD1511+009	RA: 15 14 21.2728 (228.5886367d)	Proper Motion RA: 4.35 mas/yr			V=16.5	Reference Frame: ICRS			
		Alt Name1: LB769	Dec: +00 47 52.81 (.79800d)	Proper Motion Dec: -26.855 mas/yr							
			Equinox: J2000	Parallax: 0.0064451"							
				Epoch of Position: 2000							
	Comments: 2026_Jul_27: target information verified RS										
Exposures	This object was generated by the targetselector and retrieved from the SIMBAD database.										
	SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.										
	Category=STAR										
	Description=[DA]										
Exposures	Extended=NO										
	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	NUV ACQ (COS.ta.2028)	(7) WD1511+009	COS/NUV, ACQ/IMAGE, BOA	MIRRORA		GS ACQ SCENARI O BASE1OR		40 Secs (40 Secs)		
									[==>]		[1]
	2	G130M/1055 (COS.sp.2363678)	(7) WD1511+009	COS/FUV, TIME-TAG, PSA	G130M 1055 A	LIFETIME-POS=LP7; FP-POS=ALL; BUFFER-TIME=490			600 Secs (3046 Secs)		
								[==>613.0 Secs (Split 1)]		[1]	
								[==>613.0 Secs (Split 2)]			
								[==>910.0 Secs (Split 3)]		[2]	
								[==>910.0 Secs (Split 4)]			



Proposal 18370 - Visit 08 - Rockin' photospheres: how White Dwarf stars respond to heavy metal accretion

Visit	Proposal 18370, Visit 08, implementation										Mon Aug 10 13:01:26 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/FUV, COS/NUV											
	Special Requirements: (none)											
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(8)	WD1052+273	RA: 10 54 43.3168 (163.6804867d)		Proper Motion RA: -145.274 mas/yr		V=14.22		Reference Frame: ICRS			
		Alt Name1: TON556	Dec: +27 06 57.04 (27.11584d)		Proper Motion Dec: -33.739 mas/yr							
			Equinox: J2000		Parallax: 0.0264867"							
					Epoch of Position: 2000							
		Comments: 2026_Jul_27: target information verified RS										
	This object was generated by the targetselector and retrieved from the SIMBAD database.											
	SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.											
	Category=STAR											
	Description=[DA]											
	Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	NUV ACQ (COS.ta.236 2032)	(8) WD1052+273	COS/NUV, ACQ/IMAGE, BOA		MIRRORA				15 Secs (15 Secs)		
										[==>]		[1]
	2	G130M/105 5 (COS.sp.236 3679)	(8) WD1052+273	COS/FUV, TIME-TAG, PSA		G130M 1055 A	LIFETIME-POS=LP 7;			400 Secs (1600 Secs)		
							FP-POS=ALL;			[==>(Split 1)]		[1]
							BUFFER-TIME=40 0			[==>(Split 2)]		
									[==>(Split 3)]			
									[==>(Split 4)]		[2]	





Proposal 18370 - Visit 09 - Rockin' photospheres: how White Dwarf stars respond to heavy metal accretion

Visit	Proposal 18370, Visit 09, implementation										Mon Aug 10 13:01:26 GMT 2026	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: COS/FUV, COS/NUV											
	Special Requirements: (none)											
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(9)	WD0308-565	RA: 03 09 47.9178 (47.4496575d)			Proper Motion RA: 149.261 mas/yr		V=14.14		Reference Frame: ICRS		
		Alt Name1: WG7	Dec: -56 23 49.41 (-56.39706d)			Proper Motion Dec: 66.806 mas/yr						
			Equinox: J2000			Parallax: 0.0201813"						
						Epoch of Position: 2000						
		Comments: 2026_Jul_27: target information verified RS										
	This object was generated by the targetselector and retrieved from the SIMBAD database.											
	SIMBAD listed proper motion for this target. When retrieving targets with PM from SIMBAD, APT requests the coordinates be calculated with an epoch of the year 2000. Do not modify this epoch. Always review coordinates using the Target Confirmation tool, which graphically displays the PM.											
	Category=STAR											
	Description=[DB]											
	Extended=NO											
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	NUV ACQ (COS.ta.236 2039)	(9) WD0308-565	COS/NUV, ACQ/IMAGE, BOA		MIRRORA				15 Secs (15 Secs)		
										[==>]		[1]
	2	G130M/105 5 (COS.sp.236 3680)	(9) WD0308-565	COS/FUV, TIME-TAG, PSA		G130M 1055 A	LIFETIME-POS=LP 7;			600 Secs (2400 Secs)		
							FP-POS=ALL;			[==>(Split 1)]		[1]
						BUFFER-TIME=60 0			[==>(Split 2)]			
									[==>(Split 3)]			
									[==>(Split 4)]		[2]	

